

# NAVAL POSTGRADUATE SCHOOL MONTEREY, CALIFORNIA



19980212 051

## THESIS

**ANALYSIS, DESIGN AND IMPLEMENTATION  
OF A DATABASE MANAGEMENT SYSTEM  
FOR GENERATING TECHNICAL/MEDICAL  
REPORTS BY CHIROPRACTORS**

by

Rodney A. Bolling

September, 1997

Thesis Advisor:

Tung X. Bui

Approved for public release; distribution is unlimited.

DTIC QUALITY INSPECTED 4

**REPORT DOCUMENTATION PAGE**

Form Approved OMB No. 0704-0188

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instruction, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188) Washington DC 20503.

1. AGENCY USE ONLY (Leave blank)	2. REPORT DATE September, 1997	3. REPORT TYPE AND DATES COVERED Master's Thesis
----------------------------------	-----------------------------------	---

4. TITLE AND SUBTITLE ANALYSIS, DESIGN, AND IMPLEMENTATION OF A DATABASE MANAGEMENT SYSTEM FOR GENERATING TECHNICAL/MEDICAL REPORTS BY CHIROPRACTORS

5. FUNDING NUMBERS

6. AUTHOR(S) Rodney A. Bolling

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)  
Naval Postgraduate School  
Monterey CA 93943-5000

8. PERFORMING ORGANIZATION REPORT NUMBER

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)

10. SPONSORING/MONITORING AGENCY REPORT NUMBER

11. SUPPLEMENTARY NOTES The views expressed in this thesis are those of the author and do not reflect the official policy or position of the Department of Defense or the U.S. Government.

12a. DISTRIBUTION/AVAILABILITY STATEMENT  
Approved for public release; distribution is unlimited.

12b. DISTRIBUTION CODE

13. ABSTRACT (maximum 200 words)

A medical center specializing in chiropractic care is burdened with the enormous task of managing numerous patient's records, preparing error free billing statements, and writing official business/medical. This task requires increased attention of staff personnel. The burden of paper file management could be lessened through automation of record keeping, while increasing accuracy, efficiency, and effectiveness. Valuable time for the providers and secretary could be saved through elimination of excessive paperwork which they are required to prepare.

Based on the staff requirements, this thesis designs and implements a database management system. The primary objective is to automate the current manual system to allow providers to generate official medical reports. In addition to, this system will also store, sort, and compare data relevant to all patients while minimizing the need to maintain hard copy files. The Chiro Pro 97 (CP97) Database system is designed using Microsoft Access 97.

14. SUBJECT TERMS Chiro Pro 97 Database Management System

15. NUMBER OF PAGES 60

16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT  
Unclassified

18. SECURITY CLASSIFICATION OF THIS PAGE  
Unclassified

19. SECURITY CLASSIFICATION OF ABSTRACT  
Unclassified

20. LIMITATION OF ABSTRACT  
UL



Approved for public release; distribution is unlimited.

**ANALYSIS, DESIGN AND IMPLEMENTATION OF A DATABASE  
MANAGEMENT SYSTEM FOR GENERATING TECHNICAL/MEDICAL  
REPORTS BY CHIROPRACTORS**

Rodney A. Bolling  
Lieutenant, United States Navy Reserve  
B.S., Florida A&M University, 1989

Submitted in partial fulfillment  
of the requirements for the degree of

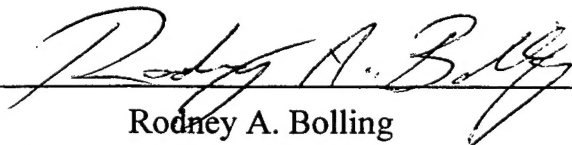
**MASTER OF SCIENCE IN INFORMATION TECHNOLOGY  
MANAGEMENT**

from the


**NAVAL POSTGRADUATE SCHOOL**

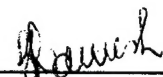
**September 1997**

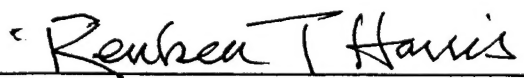
Author:

  
Rodney A. Bolling

Approved by:

  
Tung X. Bui, Thesis Advisor

  
Bala Ramesh, Associate Advisor

  
Reuben T. Harris, Chairman,  
Department of Systems Management



## **ABSTRACT**

A medical center specializing in chiropractic care is burdened with the enormous task of managing numerous patient's records, preparing error free billing statements, and writing official business/medical reports. This task requires increased attention of staff personnel. The burden of paper file management could be lessened through automation of record keeping, while increasing accuracy, efficiency, and effectiveness. Valuable time for the providers and secretary could be saved through elimination of excessive paperwork which they are required to prepare.

Based on the staff requirements, this thesis designs and implements a database management system. The primary objective is to automate the current manual system to allow providers to generate official medical reports. In addition to, this system will also store, sort, and compare data relevant to all patients while minimizing the need to maintain hard copy files. The Chiro Pro 97 (CP97) Database system is designed using Microsoft Access 97.



## TABLE OF CONTENTS

I. INTRODUCTION .....	1
A. OBJECTIVE .....	1
B. BACKGROUND .....	1
C. CHIRO PRO 97 DATABASE MANAGEMENT SYSTEM .....	2
D. CHAPTER DESCRIPTIONS .....	2
II. SYSTEM DEVELOPMENT-CP97 .....	3
A. DEFINITION PHASE .....	3
B. REQUIREMENTS PHASE .....	4
C. EVALUATION PHASE .....	5
D. DESIGN PHASE .....	5
E. IMPLEMENTATION PHASE .....	6
III. CONCLUSIONS .....	9
APPENDIX A. ENTITY RELATIONSHIP DIAGRAM .....	11
APPENDIX B. DATA DICTIONARY .....	13



APPENDIX C. MENUS AND FORMS .....	33
APPENDIX D. REPORTS .....	45
LIST OF REFERENCES .....	49
INITIAL DISTRIBUTION LIST .....	51

## **I. INTRODUCTION**

### **A. OBJECTIVE**

This thesis designs and implements a database system for the a medical center specialized in treating pain and physical therapy using chiropractic care. The purpose of the system is to manage all patient's records and to allow official medical reports to be generated automatically. Successful implementation of this database system is expected to cost effectively enhance the administration and health care of the practice.

### **B. BACKGROUND**

Managing a small medical office is not a trival task. Workflow is driven by legally required paperwork. Writing official medical reports remains one of its key aspects during daily operations. Despite continuous improvement in office automation, the generation of these reports are still done manually due to the specifications of the chiropractic domain. Due to the lack of information technology support, the writing of the medical reports is time-consuming and the filing process is inefficient. Although the reports are context-dependent in content, their format is similar and their content is narrowly defined in scope, making some automation possible.

The providers are required to write medical reports for every patient examined. These reports basically consist of the patient's general information, the history of the injury, diagnosis, treatment, and prognosis.

The providers have realized that the majority of their time is spent writing medical reports resulting in minimum number of patient's examined each day. Since some patient's

reports are similar in nature, the providers find themselves duplicating information for various patients. Most of them complain that if they could limit the time in writing the reports, twice as many patient's could be examined each day.

#### **C. CHIRO PRO 97 DATABASE MANAGEMENT SYSTEM**

The Chiro Pro 97 (CP97) database was designed to reduce the provider's time-intensive medical report writing while making storage and retrieval of vital information easier and more efficient. To accomplish this, a thorough study was conducted on the requirements of the medical staff.

Microsoft Access 97 was used to build this system. CP97 is menu and form driven and designed to be user friendly for the medical staff without any background in database systems.

#### **D. CHAPTER DESCRIPTIONS**

The main contribution of this thesis is the analysis, design, implementation and testing of the medical database and reporting system. Therefore, the writing of the thesis is limited to standard documentation required for system maintenance – i.e., the entity model, data dictionary, menu and form structures, and reports.

The CP97 development phases of the system development life cycle (SDLC) is briefly discussed in Chapter II.

Chapter III discusses conclusions, and recommendations. It also addresses areas of improvements and suggests future CP97 enhancements and possible areas for growth.

Appendices A through D provide support and substantiation of the system design.

## **II. SYSTEM DEVELOPMENT-CP97**

The Chiro Pro 97 (CP97) Database Management System was developed using the five phases of the System Development Life Cycle (SDLC). These include definition phase, requirements phase, evaluation phase, design phase, and implementation phase. [Kendall, 1995] This chapter will discuss the requirements of each phase as they relate to CP97.

### **A. DEFINITION PHASE**

The underlying problem experienced by the staff was the inability of the providers to examine more patients due to the time intensive writing of official medical reports. Additionally, the hours spent by other staff workers in maintaining the massive volume of paperwork relating to patients was excessive resulting in error prone billing statements.

As a result, the providers requested a feasibility study be conducted to design a Database Management System that could be used to maintain patient's records so that they could expeditiously extract the necessary information to generate medical reports and billing statements.

The scope of the project was to build a DBMS that would replace the numerous hard copy forms required on a patient's initial visit. If this information could be stored in a centralized location in conjunction with associated patient examination data, then the task of managing this information could be much more efficient. Medical reports could be generated automatically, and greater emphasis could be placed on managing each patient's record.

Funding for this project was not an issue. The practice had all the necessary hardware and software resources required for the design and implementation of CP97. No additional resources were needed.

Benefits of the CP97 implementation include:

- Significant reduction of man-hours by the introduction of automation.
- Quality of data entries can be reviewed more easily resulting in greater data integrity and rapid verification.
- Time savings for providers to examine more patients daily by being able to write medical reports automatically.
- Error free billing statements.

## **B. REQUIREMENTS PHASE**

The information needs of the users were gained through interviewing. The main objective of the providers interviewed was to provide a centralized location of data so that patient information was easily accessible and the medical reports could be generated automatically. For the secretary, the main objective was to limit the massive amount of paperwork required to maintain patient's records and to make retrieval of patient information quicker and easier. Due to the labor intensive manual filing system, patient's records were difficult to retrieve which resulted in time consuming drafting of medical reports. The providers had to cipher through stacks of paper work to obtain the information required in the report. Additionally, on rare occasions, the billing statements were produced in error.

Through numerous interviews and examination of the forms that were used, the user requirements were further defined and an entity relationship diagram was developed. Appendix A displays this diagram.

### **C. EVALUATION PHASE**

The medical staff's existing PC contained the necessary capabilities to effectively operate the CP97 Database Management System application. After reassessing the requirements and feasibility of the project, no additional modifications to the original requirements were necessary during this phase.

After determining the inputs, outputs and processes of the system, the metadata which defines all the data in the system, was developed. Appendix B depicts the data dictionary.

### **D. DESIGN PHASE**

The most important part of the design is the user interface which connects the user to the system through menus and forms. The CP97 menus are displayed in Appendix C. Figure 1 shows the main menu which allows the user to easily navigate to each of the submenus. Figure 2 depicts the Patient Administration Menu which allows the user to enter/view patient information or personal injury information. The Patient Examination Menu in Figure 3 allows the user to enter/view various examination information. In Figure 4, the Billing and Claims menu allows the user to enter/view charges and payment information. Figure 5 shows the Medical Report Generation Menu which allows the user to select which report he or she wishes to draft, preview, and print. Figure 6 is the Print

Reports Form. This form allows the user to select and print the reports desired. Figure 7 is the Database Maintenance menu which allows the user to maintain the database administrative functions. Figures 8 through 13 depicts the various data entry forms.

The most important reports generated by CP97 are located in Appendix D. They are the medical report and billing statement.

#### **E. IMPLEMENTATION PHASE**

Microsoft Access 97 was selected to build CP97. Utilizing all the information gathered during the requirements phase, the database tables were constructed. The next step in creating CP97 was to ensure referential integrity of the data (i.e., if data in a related table was modified, all the corresponding fields in other related tables would be modified as well).

Forms, reports, and menus were constructed using the programming capability of Microsoft Access 97. In order to make the system more user friendly, the forms and reports were designed as mirror images of the actual hard copies. This made it easier for the user to migrate from the hard copies to CP97.

The parallel conversion strategy of database implementation was selected. This strategy is most effective due to the user's desire to gradually implement the system. This strategy was utilized because it provided a way of checking the new data against the old in order to catch any errors in processing the new system. Also, by using this strategy, the users were not forced to make an abrupt change to the new system.

Training and familiarization sessions were held with the medical staff to enable them to become comfortable with the system's capabilities. A user's guide was developed

to help them navigate through CP97. Due to the simplistic nature of push button screens and menus it was not necessary to conduct more extensive training for the users. However, the system administrator received training in system installation, troubleshooting, back up techniques and providing users security accounts.

CP97 testing consisted of entering all data, both good and erroneous, related to each patient. The intent was to ensure that CP97 would accept only valid data to print the appropriate reports required by users. After generating reports using CP97, they were compared with the manual reports for discrepancies. Modifications to the system were able to correct errors as they were detected.

CP97 maintenance will primarily be performed by the system administrator who will perform daily back-ups. Revisions to the database code will be performed only by the author or someone trained in Microsoft Access 97 programming. The author is willing to provide any necessary assistance if the staff wishes to add additional capabilities to the CP97.





### III. CONCLUSIONS

The CP97 is operational and is successfully meeting the needs of the users in that it performs every function initially envisioned by the staff. The providers rely greatly on the medical report generation, while other staff members have noticed a great reduction in time required to maintain and sort through various patient's records.

The key aspect in the overall design of this system is the user interface. No matter how great the system functions, the user interface is what brings the user and the system together. This was evident in this system design. Initial design of the user interface was found to be adequate, but not up to the expectations of the users. They preferred a system that mirrored their existing hard copy forms exactly. This required the author to revisit the design phase and produce a product that conformed to the user's standards.

Database design is an iterative process involving constant communication between the designer and the user. This will ensure the final product meets the user needs.

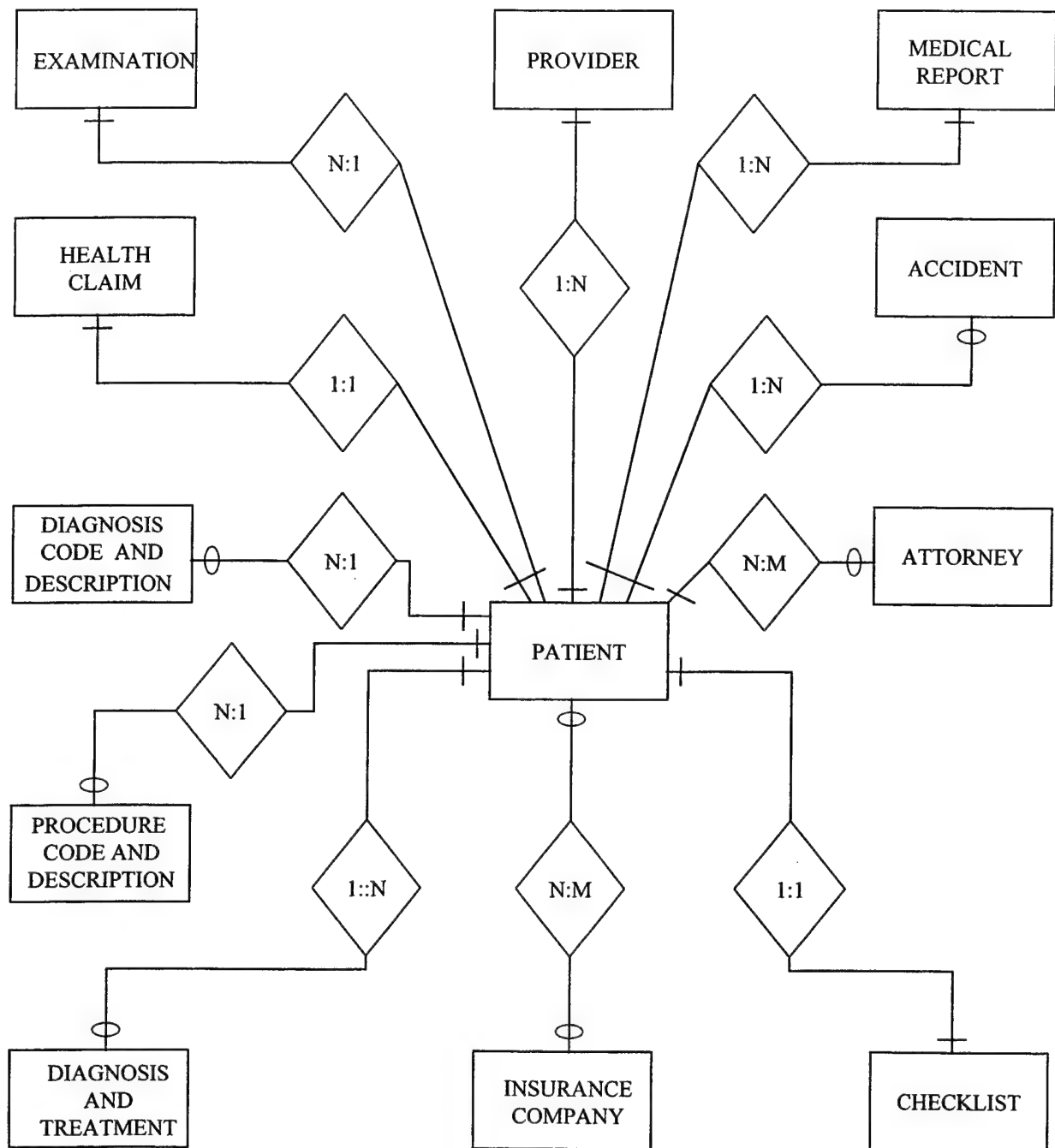
The following recommendations and future enhancements resulted from this study:

- After the first six months of implementation and annually thereafter, reevaluate the initial requirements. This will assist the current designer or any future developer in satisfying additional user needs.
- Developing an electronic filing system will strengthen this database overall functionality.

- Implementing an intelligence based application within the database could further enhance system's operation in that specific data entry errors can be corrected automatically (for example the system could automatically validate data which states that patient feels numbness in left leg, but the provider inadvertently states later that the numbness is felt in the right leg).

Overall, the system functions as designed and is operationally performing the user's required tasks. This system has increased the effectiveness of the organization in that patient's records are flawlessly maintained and medical reports are produced expeditiously.

# APPENDIX A. ENTITY RELATIONSHIP DIAGRAM





## APPENDIX B. CP97 DATA DICTIONARY

### A. ACCIDENT Entity (Weak entity of PATIENT)

**Entity Description:** Information regarding patient's accident and resulting injuries.

#### Domain Definitions

Name	Type	Size
Accident Date	Date/Time	8
- The date the accident/injury occurred. Primary key.		
File Number	Text	10
- The patient's file number. Foreign key from Patient entity.		
Consciousness	Text	20
- Patient's consciousness after the accident occurred.		
Feelings	Memo	-
- Narrative of how patient felt after the accident.		
Location	Text	35
- Place where accident/injury occurred.		
Location in Vehicle	Text	15
- Patient's location in vehicle (i.e., driver, passenger, etc.) at time of accident.		
Police Report	Yes/No	1
- Indicates whether or not a police report was filed.		
Wearing seatbelt	Yes/No	1
- Indicates whether or not seat belt was worn at time of accident.		
Behind	Yes/No	1
- Indicates area where patient's car was struck.		
Front	Yes/No	1
- Indicates area where patient's car was struck		
Left side	Yes/No	1
- Indicates area where patient's car was struck		
Right side	Yes/No	1
- Indicates area where patient's car was struck		
Speed, Other Car	Number (Byte)	1
- The speed traveled by the other car involved in the accident.		
Speed, Patient Car	Number (Byte)	1
- The speed traveled by the patient's car.		
Steering Wheel	Yes/No	1
- Item in the car where patient's body struck after impact.		
Dash board	Yes/No	1
- Item in the car where patient's body struck after impact		
Windshield	Yes/No	1
- Item in the car where patient's body struck after impact		
Head rest	Yes/No	1
- Item in the car where patient's body struck after impact		
Side window/door	Yes/No	1
- Item in the car where patient's body struck after impact		

Arm rest	Yes/No	1
- Item in the car where patient's body struck after impact		
Air bag	Yes/No	1
- Item in the car where patient's body struck after impact		
Hit What	Text	20
- Other items not listed where patient's body struck after impact.		
Time Date/Time	8	
- The time the accident occurred.		
Narrative Description	Memo	-
- A narrative description of the accident.		
Face	Yes/No	1
- Indicates whether or not this part of patient's body was hit in the car.		
Neck	Yes/No	1
- Indicates whether or not this part of patient's body was hit in the car.		
Chest	Yes/No	1
- Indicates whether or not this part of patient's body was hit in the car.		
Shoulder	Yes/No	1
- Indicates whether or not this part of patient's body was hit in the car.		
Hand	Yes/No	1
- Indicates whether or not this part of patient's body was hit in the car.		
Knee	Yes/No	1
- Indicates whether or not this part of patient's body was hit in the car.		
Leg	Yes/No	1
- Indicates whether or not this part of patient's body was hit in the car.		
Head	Yes/No	1
- Indicates whether or not this part of patient's body was hit in the car.		
Other Specific Complaint	Text	25
- Other areas of patient's body that was hit in car.		

The following are possible symptoms experienced by patients following accidents:

Headache	Yes/No	1
Neck Pain	Yes/No	1
Neck Stiff	Yes/No	1
Sleeping Problems	Yes/No	1
Back Pain	Yes/No	1
Nervousness	Yes/No	1
Tension	Yes/No	1
Irritability	Yes/No	1
Chest Pain	Yes/No	1
Dizziness	Yes/No	1
Head Heavy	Yes/No	1
Pins Needles in Arms	Yes/No	1
Pins Needles in Legs	Yes/No	1
Numb Fingers	Yes/No	1
Numb Toes	Yes/No	1

Short Breath	Yes/No	1
Fatigue	Yes/No	1
Depression	Yes/No	1
Lights Bother Eyes	Yes/No	1
Loss Memory	Yes/No	1
Ears Ring	Yes/No	1
Face Flushed	Yes/No	1
Ears Buzz	Yes/No	1
Loss Balance	Yes/No	1
Fainting	Yes/No	1
Loss Smell	Yes/No	1
Loss Taste	Yes/No	1
Diarrhea	Yes/No	1
Cold Feet	Yes/No	1
Cold Hands	Yes/No	1
Stomach Upset	Yes/No	1
Constipation	Yes/No	1
Cold Sweats	Yes/No	1
Fever	Yes/No	1
Symptoms Narrative	Memo	-
- Narrative description of other symptoms not listed.		
Last Day Worked	Date/Time	8
- The last day the patient worked as a result of the accident.		
Activity Restrictions	Memo	-
- Description of activity restrictions since the accident.		
Other Notes	Memo	-
- Other pertinent information as a result of the accident.		
Accident Before	Memo	-
- Narrative description of any previous accidents.		
Hospitalizations	Yes/No	1
- Indicates whether or not patient was hospitalized.		
Ambulance	Yes/No	1
- Indicates whether or not patient was transported by ambulance to the hospital.		
Private Transportation	Yes/No	1
- Indicates whether or not patient drove himself to the hospital.		
Neck Collar	Yes/No	1
- Indicates whether or not patient's neck was placed in a collar by ambulance attendants.		
Splint	Yes/No	1
- Indicates whether or not patient's neck was placed in a splint by ambulance attendants.		
Brace	Yes/No	1
- Indicates whether or not patient's neck was placed in a brace by ambulance attendants		
Hospital Name	Text	50
- Name of hospital.		



Doctor Name	Text	50
- Name of doctor at hospital		
X-ray	Yes/No	1
- Indicates whether or not X-rays were taken.		
Treatment	Text	70
- Treatment patient received at hospital.		
Stay At Hospital	Text	50
- Length of time patient stayed at hospital after accident.		
Treated Since Accident	Yes/No	1
- Indicates whether or not patient has been treated since the accident.		
At Time Of Accident	Yes/No	1
- Indicates when patient received treatment since the accident.		
Next Day	Yes/No	1
- Indicates when patient received treatment since the accident.		
Doctors Address	Text	100
- Address of doctor providing treatment.		
Treatment Received	Text	70
- Treatment received from the doctor.		
Improving	Yes/No	1
- Patient's status since the injury.		
Getting Worse	Yes/No	1
- Patient's status since the injury.		
Same	Yes/No	1
- Patient's status since the injury.		
Compensation	Yes/No	1
- Indicates whether or not patient has been compensated for time lost from work.		
Name Of Auto Insurance Carrier	Text	30
- Name of auto insurance company.		
Auto Insurance Policy No	Text	20
- Auto insurance policy number.		
Number Of People In Vehicle	Number (Byte)	1
- The number of people in the patient's vehicle at the time of the accident.		

## B. ATTORNEY Entity

**Entity Description:** Standard information about the attorney.

### Domain Definitions

<u>Name</u>	<u>Type</u>	<u>Size</u>
Attorney ID	Number (Long)	4
- Primary key for attorney. Sequential number generated by Access.		
Law Office Name	Text	50
- Law office where attorney is employed.		
Attorney Title	Text	4
- Prefix of attorney. (i.e., Mr., Ms., or Mrs.)		
Attorney Last Name	Text	20
- Attorney's last name.		
Attorney First Name	Text	20
- Attorney's first name.		
Attorney's Street Address	Text	30
- Attorney's employment address.		
Attorney's City	Text	15
- City of attorney's employment.		
Attorney State	Text	2
- State of attorney's employment		
Attorney's Zip Code	Text	10
- Zip code of attorney's employment.		
Attorney's Phone	Text	14
- Phone number of attorney.		

## C. CHECKLIST Entity (Weak entity of PATIENT)

**Entity Description:** This is cover sheet that is sent with the selected reports to insurance companies, attorneys or the patients.

### Domain Definitions

<u>Name</u>	<u>Type</u>	<u>Size</u>
File Number	Text	10
- Patient's file number. Foreign key of Patient entity.		
Claim Number	Text	5
- Sequential number.		
From	Text	10
- Heading containing the name of medical center.		
To	Memo	-
- Addressee of organization or person receiving the attached reports.		

The following indicates selected reports to print:

Patient Information Form	Yes/No	1
Doctor's Lien	Yes/No	1
Consent for Chiropractic Treatment and Care	Yes/No	1

Assignment of Benefits	Yes/No	1
Personal Injury Questionnaire	Yes/No	1
SOAP	Yes/No	1
Chiropractic Examination	Yes/No	1
Diagnosis Work Sheet	Yes/No	1
Doctor Narrative Report	Yes/No	1
Itemized Statement	Yes/No	1
Health Claim	Yes/No	1
All Documents	Yes/No	1
Medical Report 1	Yes/No	1
Medical Report 2	Yes/No	1
Financial Hardship	Yes/No	1
Message	Memo	-
- Narrative of additional information.		

#### **D. DIAGNOSIS and TREATMENT Entity** (Weak entity of PATIENT)

**Entity Description:** Diagnosis and treatment provided for a specific complaint or injury.

##### **Domain Definitions**

<b>Name</b>	<b>Type</b>	<b>Size</b>
Accident Date	Date/Time	8
- Date of the accident/injury. Foreign key of Accident entity		
File Number	Text	10
- Patient's file number. Foreign key from Patient entity.		
Date of Visit	Date/Time	8
- The date patient visited the medical center. Primary key.		
Subjective Notes	Memo	-
- Patient's narrative of how he/she feels.		
Problem Focused	Yes/No	1
- Objective symptoms		
Expanded	Yes/No	1
- Objective symptoms		
Detailed	Yes/No	1
- Objective symptoms		
Comprehensive	Yes/No	1
- Objective symptoms		
Stiffness	Yes/No	1
- Objective symptoms		
Tender	Yes/No	1
- Objective symptoms		
ROM Cervical	Yes/No	1
- Objective symptoms		
ROM Lumbar	Yes/No	1
- Objective symptoms		
Orthopedic	Yes/No	1

- Objective symptoms		
Neurological	Yes/No	1
- Objective symptoms		
Complexity	Text	15
- Complexity of the injury.		
Severity	Text	15
- Severity of the injury		
Pain Yes/No	1	
- Objective symptoms		
Tingling	Yes/No	1
- Objective symptoms		
Tightness	Yes/No	1
- Objective symptoms		
Spasm	Yes/No	1
- Objective symptoms		
Swelling	Yes/No	1
- Objective symptoms		
Manipulation	Yes/No	1
- Treatment provided.		
Ultrasound	Yes/No	1
- Treatment provided.		
Electrical Stimulation	Yes/No	1
- Treatment provided.		
Interseg Traction	Yes/No	1
- Treatment provided.		
Infrared	Yes/No	1
- Treatment provided.		
Deep Tissue Therapy	Yes/No	1
- Treatment provided.		
Heat/Cold Pack	Yes/No	1
- Treatment provided.		
Biofeedback	Yes/No	1
- Treatment provided.		
X-ray Diagnosis	Yes/No	1
- Treatment provided.		
Other	Text	50
- Other treatment provided.		
Prescriptions Supplies	Memo	-
- Prescriptions and supplies provided to patient.		
Getting Worse	Yes/No	1
- Patient's status after receiving treatment.		
Same	Yes/No	1
- Patient's status after receiving treatment.		
Better	Yes/No	1
- Patient's status after receiving treatment.		

**E. EXAMINATION Entity** (Weak entity of PATIENT)**Entity Description:** Tests and examination results.**Domain Definitions**

<b>Name</b>	<b>Type</b>	<b>Size</b>
Accident Date	Date/Time	8
- Date of the accident/injury. Foreign key form Accident entity.		
File Number	Text	10
- Patient's file number. Foreign key from Patient entity.		
Exam Test Date	Date/Time	8
- The date the patient was examined. Primary key.		

The following are various tests that are conducted during a patient's examination. For the test that are yes/no data types, they give indication whether the test were negative or positive.

Blood Pressure/Left Arm	Text	7
Blood Pressure/Right Arm	Text	7
Cervical ROM Extension	Number (Byte)	3
Cervical ROM Extension Notes	Text	50
Cervical ROM Flexion	Number (Byte)	3
Cervical ROM Flexion Notes	Text	50
Cervical ROM Left Lateral	Number (Byte)	3
Cervical ROM Left Lateral Notes	Text	50
Cervical ROM Left Rotation	Number (Byte)	3
Cervical ROM Left Rotation Notes	Text	50
Cervical ROM Right Lateral	Number (Byte)	3
Cervical ROM Right Lateral Notes	Text	50
Cervical ROM Right Rotation	Number (Byte)	3
Cervical ROM Right Rotation Notes	Text	50
Dorsolumbar ROM Extension	Number (Byte)	3
Dorsolumbar ROM Extension Notes	Text	50
Dorsolumbar ROM Flexion	Number (Byte)	3
Dorsolumbar ROM Flexion Notes	Text	50
Dorsolumbar ROM Left Lateral	Number (Byte)	3
Dorsolumbar ROM Left Lateral Notes	Text	50
Dorsolumbar ROM Left Rotation	Number (Byte)	3
Dorsolumbar ROM Left Rotation Notes	Text	50
Dorsolumbar ROM Right Lateral	Number (Byte)	3
Dorsolumbar ROM Right Lateral Notes	Text	50
Dorsolumbar ROM Right Rotation	Number (Byte)	3
Dorsolumbar ROM Right Rotation Notes	Text	50
DTR Achilles Left	Number (Byte)	1
DTR Achilles Right	Number (Byte)	1
DTR Biceps Left	Number (Byte)	1
DTR Biceps Right	Number (Byte)	1
DTR Patellar Left	Number (Byte)	1

DTR Patellar Right	Number (Byte)	1
DTR Radial Left	Number (Byte)	1
DTR Radial Right	Number (Byte)	1
DTR Triceps Left	Number (Byte)	1
DTR Triceps Right	Number (Byte)	1
Dynamometer, Left	Text	10
Dynamometer, Right	Text	10
Height	Text	5
Pulse	Number(Byte)	3
Weight	Number (Byte)	3
Subjective Symptoms	Memo	-
New Symptoms	Memo	-
Difference	Number (Long)	4
Improvement	Number (Integer)	2
Comments	Memo	-
Bilateral Scale Differential Left	Number (Long)	4
Bilateral Scale Differential Right	Number (Long)	4
Postural Analysis	Number (Byte)	1
George's Test Left	Text	10
George's Test Right	Text	10
Adson's Test, Left	Yes/No	1
Foramina Comp Test, Center	Yes/No	1
Foramina Comp Test, Left	Yes/No	1
Foramina Comp Test, Right	Yes/No	1
Adson's Test, Right	Yes/No	1
Bechterew Test, Both	Yes/No	1
Bechterew Test, Left	Yes/No	1
Bechterew Test, Right	Yes/No	1
Braggard's Sign, Left	Yes/No	1
Braggard's Sign, Right	Yes/No	1
Derifield Test, Left	Yes/No	1
Derifield Test, Right	Yes/No	1
Distraction Test, Center	Yes/No	1
Distraction Test, Left	Yes/No	1
Distraction Test, Right	Yes/No	1
DLR Test	Yes/No	1
Ely Heel to Buttock Test, Left	Yes/No	1
Ely Heel to Buttock Test, Right	Yes/No	1
Ely's Sign, Left	Yes/No	1
Ely's Sign, Right	Yes/No	1
Erichson's Sign	Yes/No	1
Fajerstajn Test, Left	Yes/No	1
Fajerstajn Test, Right	Yes/No	1
Heel Walk Test	Yes/No	1
Heri's Browning Sign, Left	Yes/No	1
Heri's Browning Sign, Right	Yes/No	1

Hibb's Test, Left	Yes/No	1
Hibb's Test, Right	Yes/No	1
Hoover's Test, Left	Yes/No	1
Hoover's Test, Right	Yes/No	1
Kemp's Test, Left	Yes/No	1
Kemp's Test, Right	Yes/No	1
Lasitude Test, Left	Yes/No	1
Lasitude Test, Right	Yes/No	1
Leg Lowering Test, Left	Yes/No	1
Leg Lowering Test, Right	Yes/No	1
Lewin Supine Test	Yes/No	1
Linder's Sign	Yes/No	1
Maximum Cerv Comp Test, Left	Yes/No	1
Maximum Cerv Comp Test, Right	Yes/No	1
Nachlas Test, Left	Yes/No	1
Nachlas Test, Right	Yes/No	1
Patrick's Test, Left	Yes/No	1
Patrick's Test, Right	Yes/No	1
Romberg's Sign	Yes/No	1
Shoulder Depr Test, Left	Yes/No	1
Shoulder Dpr Test Right	Yes/No	1
Sicard's Sign, Left	Yes/No	1
Sicard's Sign, Right	Yes/No	1
Soto-Hall Test, Cervical	Yes/No	1
Soto-Hall Test, Lumbar	Yes/No	1
Soto-Hall Test, Thoracic	Yes/No	1
Toe Walk Test	Yes/No	1
Valsalvas Maneuver, Cervical	Yes/No	1
Valsalvas Maneuver, Lumbar	Yes/No	1
Valsalvas Maneuver, Thoracic	Yes/No	1
Neuro Ortho Test Notes	Memo	-
Spinal Palpation OCCI L	Number (Byte)	1
Spinal Palpation OCCI R	Number (Byte)	1
Spinal Palpation AT L	Number (Byte)	1
Spinal Palpation AT R	Number (Byte)	1
Spinal Palpation AX L	Number (Byte)	1
Spinal Palpation AX R	Number (Byte)	1
Spinal Palpation C3 L	Number (Byte)	1
Spinal Palpation C3 R	Number (Byte)	1
Spinal Palpation C4 L	Number (Byte)	1
Spinal Palpation C4 R	Number (Byte)	1
Spinal Palpation C5 L	Number (Byte)	1
Spinal Palpation C5 R	Number (Byte)	1
Spinal Palpation C6 L	Number (Byte)	1
Spinal Palpation C6 R	Number (Byte)	1
Spinal Palpation C7 L	Number (Byte)	1

Spinal Palpation C7 R	Number (Byte)	1
Spinal Palpation D1 L	Number (Byte)	1
Spinal Palpation D1 R	Number (Byte)	1
Spinal Palpation D2 L	Number (Byte)	1
Spinal Palpation D2 R	Number (Byte)	1
Spinal Palpation D3 L	Number (Byte)	1
Spinal Palpation D3R	Number (Byte)	1
Spinal Palpation D4L	Number (Byte)	1
Spinal Palpation D4R	Number (Byte)	1
Spinal Palpation D5L	Number (Byte)	1
Spinal Palpation D5R	Number (Byte)	1
Spinal Palpation D6L	Number (Byte)	1
Spinal Palpation D6R	Number (Byte)	1
Spinal Palpation D7L	Number (Byte)	1
Spinal Palpation D7R	Number (Byte)	1
Spinal Palpation D8L	Number (Byte)	1
Spinal Palpation D8R	Number (Byte)	1
Spinal Palpation D9L	Number (Byte)	1
Spinal Palpation D9R	Number (Byte)	1
Spinal Palpation D10L	Number (Byte)	1
Spinal Palpation D10R	Number (Byte)	1
Spinal Palpation D11L	Number (Byte)	1
Spinal Palpation D11R	Number (Byte)	1
Spinal Palpation D12L	Number (Byte)	1
Spinal Palpation D12R	Number (Byte)	1
Spinal Palpation L1L	Number (Byte)	1
Spinal Palpation L1R	Number (Byte)	1
Spinal Palpation L2L	Number (Byte)	1
Spinal Palpation L2R	Number (Byte)	1
Spinal Palpation L3L	Number (Byte)	1
Spinal Palpation L3R	Number (Byte)	1
Spinal Palpation L4L	Number (Byte)	1
Spinal Palpation L4R	Number (Byte)	1
Spinal Palpation L5L	Number (Byte)	1
Spinal Palpation L5R	Number (Byte)	1
Spinal Palpation S L	Number (Byte)	1
Spinal Palpation S R	Number (Byte)	1
Spinal Palpation SI L	Number (Byte)	1
Spinal Palpation SI R	Number (Byte)	1
Spinal Palpation IL L	Number (Byte)	1
Spinal Palpation IL R	Number (Byte)	1

The following provide remarks/notes of the positive examination tests.

Foramina Center Remarks	Text	70
Foramina Left Remarks	Text	70
Foramina Right Remarks	Text	70



Shoulder Depr Left Remarks	Text	70
Shoulder Depr Right Remarks	Text	70
Distraction Center Remarks	Text	70
Distraction Left Remarks	Text	70
Distraction Right Remarks	Text	70
Max Cerv Comp Left Remarks	Text	70
Max Cerv Comp Right Remarks	Text	70
Valsalvas Cervical Maneuver Remarks	Text	70
Valsalvas Thoracic Maneuver Remarks	Text	70
Valsalvas Lumbar Maneuver Remarks	Text	70
Adsons Left Remarks	Text	70
Adsons Right Remarks	Text	70
Bechterew Left Remarks	Text	70
Bechterew Right Remarks	Text	70
Bechterew Both Remarks	Text	70
Heel Remarks	Text	70
Toe Walk Remarks	Text	70
Rombergs Remarks	Text	70
Kemp Left Remarks	Text	70
Kemp Right Remarks	Text	70
Neri Bowing Left Remarks	Text	70
Neri Bowing Right Remarks	Text	70
Lasague Remarks	Text	70
Lasague Right Remarks	Text	70
Braggard Remarks	Text	70
Braggard Right Remarks	Text	70
Fajerstajn Remarks	Text	70
Fajerstajn Right Remarks	Text	70
Sicards Remarks	Text	70
Sicards Right Remarks	Text	70
DLR Left Remarks	Text	70
DLR Right Remarks	Text	70
Leg Lowering Left Remarks	Text	70
Leg Lowering Right Remarks	Text	70
Hoover Left Remarks	Text	70
Hoover Right Remarks	Text	70
Lewin Remarks	Text	70
Linders Left Remarks	Text	70
Linders Right Remarks	Text	70
Patricks Left Remarks	Text	70
Patricks Right Remarks	Text	70
Soto Hall Cervical Remarks	Text	70
Soto Hall Thoracic Remarks	Text	70
Soto Hall Lumbar Remarks	Text	70
Ely Sign Remarks	Text	70
Ely Sign Right Remarks	Text	70

Nachlas Left Remarks	Text	70
Nachlas Right Remarks	Text	70
Erichsens Left Remarks	Text	70
Erichsens Right Remarks	Text	70
Derifield Left Remarks	Text	70
Derifield Right Remarks	Text	70
Hibbs Left Remarks	Text	70
Hibbs Right Remarks	Text	70
Ely Heel to But Left Remarks	Text	70
Ely Heel to But Right Remarks	Text	70

The following indicates which exam is being performed:

Initial Exam	Yes/No	1
Subsequent Exam	Yes/No	1
Final Exam	Yes/No	1

#### F. DIAGNOSTIC CODES AND DESCRIPTIONS Entity

**Entity Description:** The specific codes and descriptions describing a patient's diagnosis after examination.

##### Domain Definitions

<u>Name</u>	<u>Type</u>	<u>Size</u>
File Number	Text	10
- File Number of patient. Primary key.		
Diagnostic Code	Text	12
- The code designated for the different diagnosis.		
Diagnostic Description	Text	70
- Description of the codes.		

#### G. HEALTH INSURANCE CLAIM Entity (Weak entity of Patient)

**Entity Descriptions:** Contains all the relevant information required to file claim with insurance company.

##### Domain Definitions

<u>Name</u>	<u>Type</u>	<u>Size</u>
PICA	Text	3
- Three digit code entered by medical center.		
Type of Insurance	Text	50
- Type of insurance coverage patient currently maintains.		
Insured's ID Number	Text	15
- ID number of person insured. Primary key.		
File Number	Text	10
- Patient's file number. Foreign key from patient.		

Relationship To Insured	Text	8
- Patient's relationship to the person insured.		
Single	Yes/No	1
- Patient's marital status		
Married	Yes/No	1
- Patient's marital status.		
Employed	Yes/No	1
- Status of patient's employment		
Full-Time Student	Yes/No	1
- Indication of patient being a full time student.		
Part-Time Student	Yes/No	1
- Indication of patient being a part time student.		
Insured's Policy Group or FECA Number	Text	15
- Insurance policy number held by insured person.		
Insured's Birthdate	Date/Time	8
- Birth date of insured person.		
Insured's Sex	Text	8
- Sex of insured person.		
Insured Employer's Name	Text	25
- Insured person's employer's name		
Insured Insurance Plan Name	Text	20
- Insured person's insurance name.		
Insured's Street Address	Text	30
- Insured person's home street address.		
Insured's City	Text	15
- Insured person's home city of residence.		
Insured's State	Text	2
- Insured person's home state of residence.		
Insured's Zip Code	Text	10
- Insured person's home zip code.		
Insured's Phone Number	Text	14
- Insured person's phone number.		
Other Insured's Last Name	Text	15
- Other insured person's last name.		
Other Insured's First Name	Text	15
- Other insured person's first name.		
Other Insured's Middle Initial	Text	2
- Other insured person's middle initial.		
Other Insured's Policy or Group Number	Text	15
- Other insured person's insurance policy number.		
Other Insured's Birth date	Date/Time	8
- Other insured person's birth date.		
Other Insured's Sex	Text	8
- Sex of other insured person.		
Other Insured Employer's Name	Text	25
- Employer's name of other insured person.		

Other Insured Insurance Plan Name	Text	20
- Other insured person's insurance plan name.		
Employment	Yes/No	1
- Indicates that patient's injury was related to employment.		
Auto Accident	Yes/No	1
- Indicates that patient's injury was related to an auto accident.		
Place	Text	2
- State abbreviation where accident happened.		
Other Accident	Yes/No	1
- Indicates that patient's injury was related to another accident.		
Health Benefit Plan	Yes/No	1
- Indication of patient maintaining an additional health benefit plan.		
Date of Similar Illness	Date/Time	8
- The date of a similar injury/illness.		
Beginning Date	Date/Time	8
- The date the patient was unable to work.		
Ending Date	Date/Time	8
- The date the patient returned to work.		
Referring Physician	Text	20
- The physician recommending the patient to this medical center.		
Referring Physician ID Number	Text	15
- ID number of referring physician.		
Date Admitted to Hospital	Date/Time	8
- The date the patient was admitted to the hospital.		
Discharged Date	Date/Time	8
- Date discharged from hospital.		
Outside Lab	Yes/No	1
- Indicates whether or not patient was seen another lab		
Charge	Currency	8
- Charges incurred from outside lab visit.		
Medicaid Resubmission Code	Text	15
- Medicaid code.		
Original Reference Number	Text	15
- Reference number of resubmission code.		
Prior Authorization Number	Text	30
- Authorization number.		
Federal Tax ID Number	Text	15
- Tax ID number.		
SSN Yes/No	1	
- Indicates that Tax ID number is patient's SSN.		
EIN Yes/No	1	
- Indicates that Tax ID number is patient's employment ID number.		
Patient's Account Number	Text	15
- Patient's account number.		
Total Charge	Currency	8
- Total charges billed to patient.		

Amount Paid	Currency	8
- Total amount paid on the account.		
Balance Due	Currency	8
- The balance remaining on the account.		
Facility's Name	Text	50
- Name of facility where services were rendered.		
Facility's Address	Text	30
- Address of facility.		
Facility's City	Text	15
- City of facility.		
Facility State	Text	2
- State of facility.		
Facility's Zip Code	Text	10
- Zip code.		
Physician's Billing Name	Text	50
- Name of physician.		
Physician's Address	Text	30
- Address of physician.		
Physician's City	Text	15
- City.		
Physician's State	Text	2
- State.		
Physician's Zip Code	Text	10
- Zip code.		
Physician's Phone Number	Text	14
- Physician's phone number.		
PIN Number	Text	25
- Physicians PIN number.		
Group Number	Text	25
- Physicians group number.		

## H. INSURANCE COMPANY Entity

**Entity Description:** Patient insurance company information.

### Domain Definitions

<u>Name</u>	<u>Type</u>	<u>Size</u>
Insurance Company Name	Text	30
- Name of insurance company. Primary key.		
Address	Text	25
- Address of insurance company.		
Suite	Text	10
- Suite number of insurance company.		
City	Text	15
- City of insurance company.		
State	Text	2
- State of insurance company.		

Zip	Text	10
- Zip code of insurance company.		
Phone Number	Text	18
- Insurance company phone number.		
Insurance Policy Number	Text	20
- Insurance policy number of insured person.		
Insured Last Name	Text	50
- Last name of person insured.		
Insured First Name	Text	50
- First name of person insured.		
Insurance Type	Text	15
- Type of insurance.		
Group Number	Text	15
- Insurance policy group number.		
Membership Number	Text	15
- Patient's membership number.		
Social Security No	Text	11
- Social security number of insured person.		

#### I. **MEDICAL REPORT Entity** ( Weak entity of PATIENT)

**Entity Description:** Information pertaining to patient's chiropractic care used in generating medical reports.

##### **Domain Definitions**

<u>Name</u>	<u>Type</u>	<u>Size</u>
File Number	Text	10
- Patient's file number. Primary key.		
Date Of Injury	Date/Time	8
- Date patient was injured.		
Attention	Text	50
- Person the medical report is addressed to.		
History	Memo	-
- A description of the history of the patient's injury.		
Examination	Memo	-
- Description of examination information.		
Treatment Combination	Text	100
- The overall treatment the patient received while under the medical center's care.		
Pain/Discomfort Of Lumbar Spine	Text	100
- The area where pain/discomfort is felt in the lumbar spine.		
Patient Status	Text	15
- The patient status after treatment.		
Date Of Final Treatment	Date/Time	8
- The final date of treatment.		
Prognosis	Text	10
- Patient's prognosis after receiving treatment.		

## J. PATIENT Entity

**Entity Description:** Personal information of the patient.

### Domain Definitions

<u>Name</u>	<u>Type</u>	<u>Size</u>
File Number	Text	10
- Patient's file number. Primary key.		
Title	Text	4
- Prefix of patient. (i.e., Mr., Ms., or Mrs.)		
Last Name	Text	15
- Last name of patient.		
First Name	Text	15
- First name of patient.		
Middle Name	Text	15
- Middle name of patient.		
Sex	Text	6
- Sex of patient.		
Visit Date	Date/Time	8
- Initial visit date to this medical center.		
Social Security Number	Text	11
- Social security number of patient.		
Drivers License Number	Text	20
- Patient's drivers license number.		
Address	Text	40
- Patient's street address.		
City	Text	15
- Patient's city of residence.		
State	Text	2
- Patient's state of residence.		
Zip	Text	10
- Zip code.		
Home Phone	Text	14
- Patient's home phone number.		
Age	Number (Integer)	2
- Patient's age.		
Date Of Birth	Date/Time	8
- Patient's birth date		
Occupation	Text	25
- Patient's type of employment.		
Employer Name	Text	30
- Patient's employer's name.		
Employer's Address	Text	25
- Address of patient's employer.		
Employer's City	Text	15
- City where patient is employed.		

Employer's State	Text	2
- State of patient's employment.		
Employer's Zip	Text	11
- Zip code of employer.		
Work Phone	Text	25
- Patient's work phone.		
Family Physician Yes	Yes/No	1
- Indicates patient has a family physician.		
Family Physician No	Yes/No	1
- Indicates patient does not have a family physician.		
Family Physician First Name	Text	15
- Patient's family physician first name.		
Family Physician Last Name	Text	15
- Last name of patient's family physician.		
Family Physician's Phone Number	Text	25
- Family physician's phone number.		
Previous Chiropractor	Text	15
- Previous chiropractor's first and last name.		
Emergency Contact First Name	Text	15
- First name of person to contact in case of emergency.		
Emergency Contact Last Name	Text	15
- Last name of emergency contact.		
Emergency Contact Home Phone	Text	14
- Phone number of emergency contact.		
Emergency Contact Relationship	Text	10
- Patient's relationship to emergency contact person.		
Provider Social Security Number	Text	9
- Provider's social security number. Foreign key of Provider entity.		
Attorney Representation	Yes/No	1
- Indicates whether or not patient is represented by an attorney.		
Date Of Last Visit	Date/Time	8
- Date of last visit to previous chiropractor.		
Attorney ID	Number (Long)	4
- Foreign key of Attorney entity.		

#### L. Procedure Description and Code Entity (Weak entity of PATIENT)

**Entity Description:** Information pertaining to the treatment the patient received and the amount charged.

##### Domain Definitions

<u>Name</u>	<u>Type</u>	<u>Size</u>
File Number	Text	10
- Patient's file number. Primary key.		
Date	Date/Time	8
- The date the patient was treated.		



CPT	Text	10
- The code of the particular treatment received.		
Procedure Description	Text	50
- Name of the treatment received.		
Charge	Currency	8
- The amount charged for the treatment.		

#### M. PROVIDER Entity

**Entity Description:** Information about providers employed by the medical center.

##### Domain Definitions

<u>Name</u>	<u>Type</u>	<u>Size</u>
Social Security Number	Text	9
- Provider's social security number. Primary key.		
Provider Last Name	Text	15
- Last name of medical center provider.		
Provider First Name	Text	15
- First name of medical center provider.		
Provider Middle Name	Text	15
- Middle name of medical center provider.		
Provider's Address	Text	25
- Home address of medical center provider.		
Provider City	Text	15
- Provider's home city.		
Provider State	Text	2
- Provider's home state.		
Provider's Zip	Text	11
- Provider's home zip code.		
Provider's Home Phone	Text	14
- Provider's home phone number.		
Work Phone	Text	25
- Provider's work phone number.		

## APPENDIX C. MENUS AND FORMS

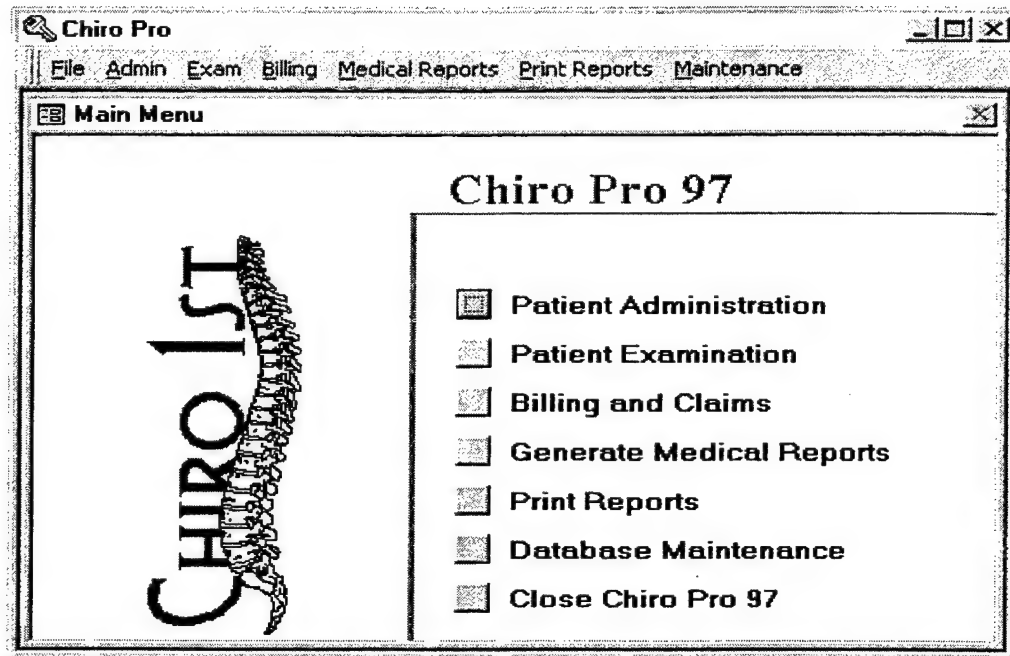


Figure 1. CP97 Main Menu

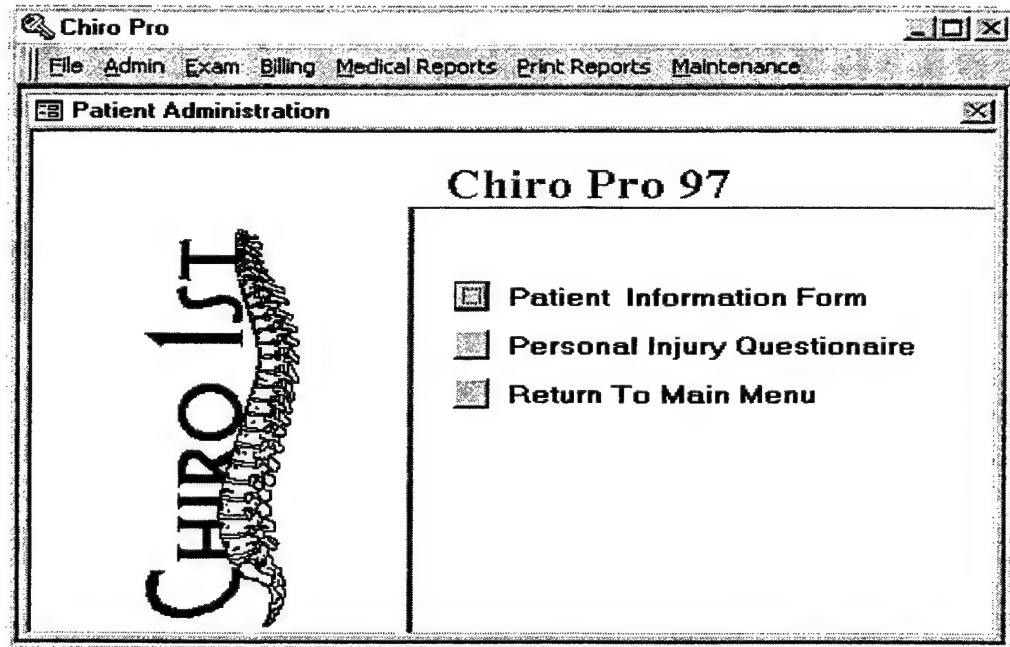


Figure 2. Patient Administration Menu

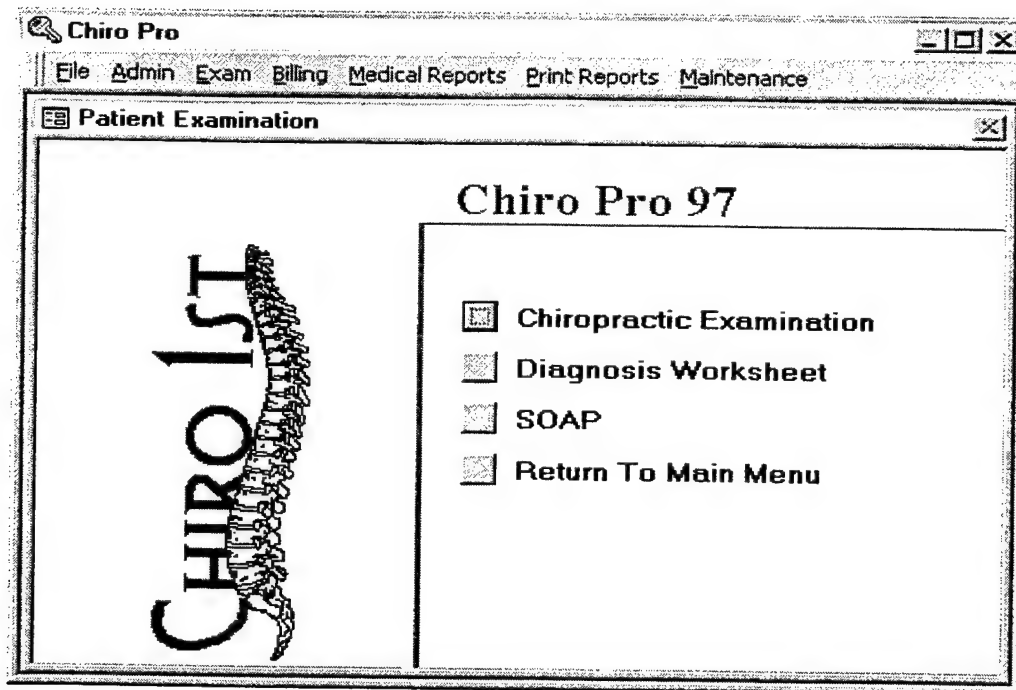


Figure 3. Patient Examination Menu

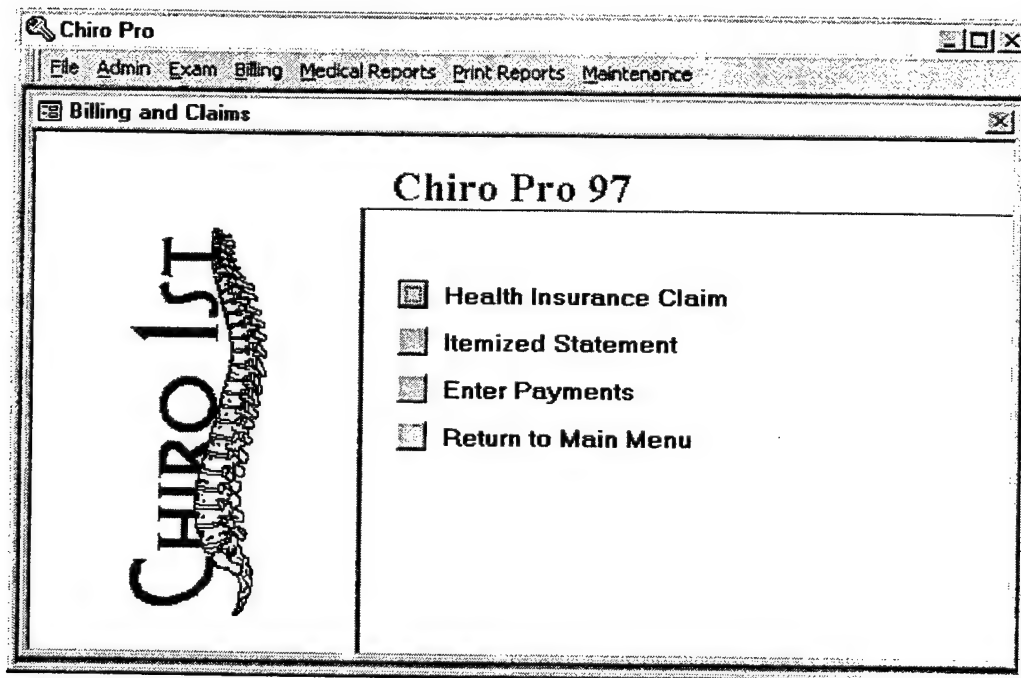


Figure 4. Billing and Claims Menu

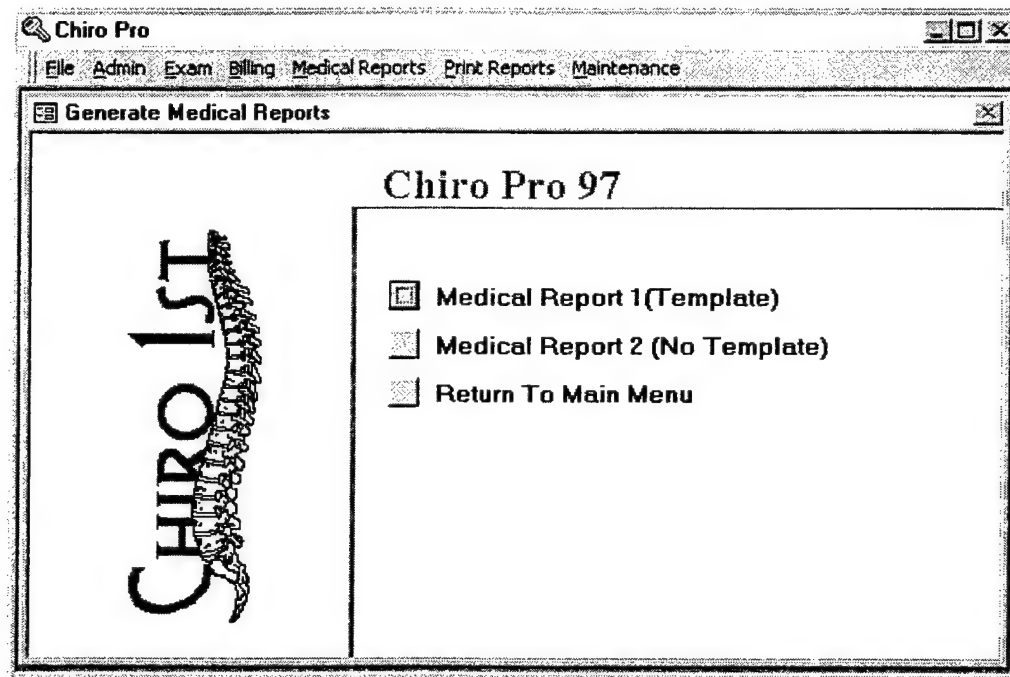


Figure 5. Medical Report Generation Menu

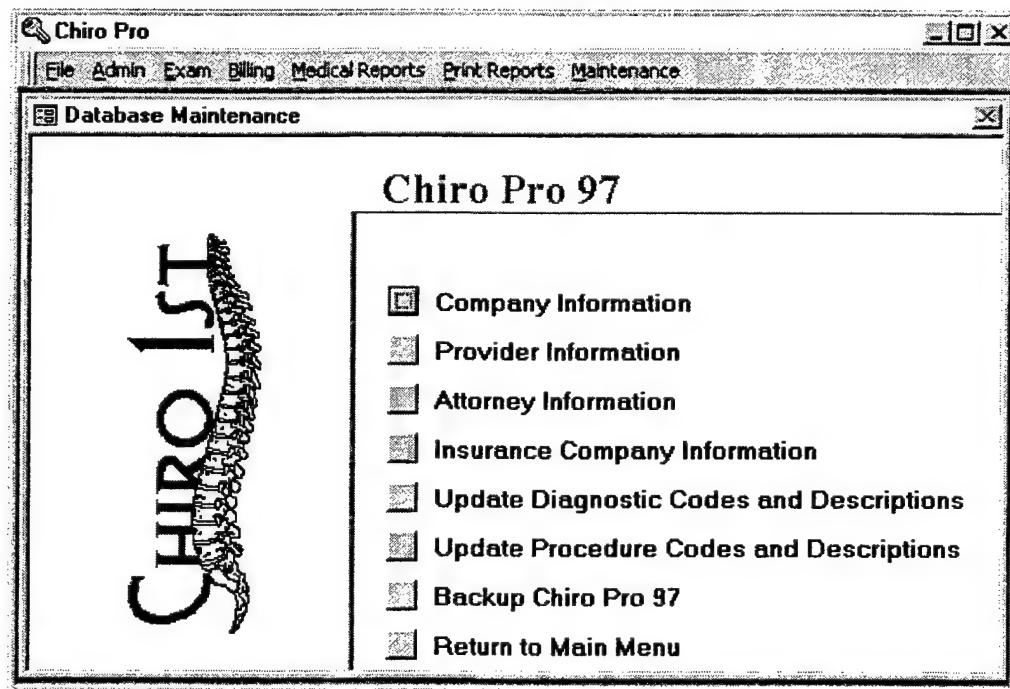


Figure 6. Database Maintenance Menu


**Chiro Pro**

File Admin Exam Billing Medical Reports Print Reports Maintenance

**Print Reports**

## PRINT REPORTS

Patient : ,

File Number: \_\_\_\_\_ Select Patient 

---

Claim Number: \_\_\_\_\_

From: |

To: \_\_\_\_\_

Select the appropriate reports you wish to print:

<input type="checkbox"/> Patient Information Form	<input type="checkbox"/> Chiropractic Examination
<input type="checkbox"/> Doctor's Lien	<input type="checkbox"/> Diagnosis Work Sheet
<input type="checkbox"/> Informed Consent for Chiropractic Treatment and Care	<input type="checkbox"/> Doctor Narrative Report
<input type="checkbox"/> Assignment of Benefits	<input type="checkbox"/> Itemized Statement
<input type="checkbox"/> Personal Injury Questionnaire	<input type="checkbox"/> Health Claim
<input type="checkbox"/> SOAP	<input type="checkbox"/> Financial Hardship
<input type="checkbox"/> All Documents	

In addition to selecting Doctor's Narrative Report above, select which medical report you wish to print. (This is the report you generated earlier.)

☐ Medical Report 1

☐ Medical Report 2

Message:

☐ Find Patient   ☐ Print Selected Reports   ☐ Return To Main Menu

Figure 7. Print Reports Form

Chiro Pro - [Patient Information Form : Form]			
File Admin Exam Billing Medical Reports Print Reports Maintenance			
<b>PATIENT INFORMATION FORM</b>			
Select Patient <input type="button" value="Select"/>			
Chiro Provider: <input type="button" value="Select"/>		Visit Date:	File Number:
<b>PERSONAL INFORMATION:</b>			
Name(Title,Last,First,Middle): <input type="button" value="Select"/>		Sex: <input type="button" value="Select"/>	
Street Address:		City:	State: Zip Code:
Home Phone:		Work Number.:	
Social Security Number:		Date of Birth:	Age:
Driver's License Number:			
Occupation.:		Employer:	
Employer Street Address:		City:	State: Zip Code:
Does patient have a family physician? <input type="checkbox"/> Yes <input type="checkbox"/> No Last Name: First Name:			
Previous Chiropractor:		Date Of Last Visit:	
<b>ILLNESS/INJURY INFORMATION:</b>			
<input type="button" value="Add New Accident/Injury Info"/> <input type="button" value="Next Injury Record"/> <input type="button" value="Previous Injury Record"/>			
Date of Accident/Injury:		Time:	Location:
Name of Auto Insurance Co.:		Policy No:	
Did patient get a police report? <input type="checkbox"/> If yes, obtain copy from patient.			
Is patient represented by an attorney? <input type="checkbox"/> Yes <input type="checkbox"/> No If yes,provide attorney info below:			
Select Attorney <input type="button" value="Select"/>			
Last Name:		First Name:	
Address:		City:	State: Zip Code:
Phone:			
<input type="button" value="New Patient"/> <input type="button" value="Personal Injury Form"/> <input type="button" value="SOAP Form"/> <input type="button" value="Print Personal Info Form"/>			
<input type="button" value="Find Patient"/> <input type="button" value="Examination Form"/> <input type="button" value="Diagnosis Worksheet"/> <input type="button" value="Return To Admin Menu"/>			

Figure 8. Patient Information Form


Chiro Pro - [Injury Form : Form]			
<b>PERSONAL INJURY QUESTIONNAIRE</b>			
Patient :			
File Number :			
DATE OF INJURY :			Find Patient 
<b>NATURE OF ACCIDENT:</b>		Narrative Description of accident:	
Date:	Time:		
Location of Accident:			
Location in vehicle where patient was riding:			
Number of people in patient's vehicle:			
Was patient wearing a seatbelt?			
Was patient struck from:			
<input type="checkbox"/> Behind <input type="checkbox"/> Front <input type="checkbox"/> Left Side <input type="checkbox"/> Right side			
Approximate speed of:			
Patient's vehicle:	mph <input checked="" type="checkbox"/> Don't remember		
Other vehicle:	mph <input checked="" type="checkbox"/> Don't know		
<b>Accident Impact:</b>			
Did patient strike anything inside vehicle at time of impact? If yes, specify; if no, leave blank.			
<input type="checkbox"/> Steering wheel <input type="checkbox"/> Dash board <input type="checkbox"/> Windshield <input type="checkbox"/> Head rest <input type="checkbox"/> Side window/door <input type="checkbox"/> Arm rest <input type="checkbox"/> Air Bag			
Part of body that got hit: <input type="checkbox"/> Face <input type="checkbox"/> Neck <input type="checkbox"/> Chest <input type="checkbox"/> Shoulder <input type="checkbox"/> Hand <input type="checkbox"/> Knee <input type="checkbox"/> Leg <input type="checkbox"/> Head			
How did patient feel immediately, hours, and days after the accident?			
Was patient ever unconscious? If yes, for how long?			
Has patient ever been involved in a car accident before? If yes, describe date(s), type(s) of accidents and injury(ies) received?:			
<b>HOSPITAL INFORMATION:</b>			
Did patient go to the hospital? <input checked="" type="checkbox"/> Yes <input checked="" type="checkbox"/> No    If yes, when?			
How did patient get to the hospital? <input checked="" type="checkbox"/> Ambulance <input checked="" type="checkbox"/> Private transportation			
Did the ambulance attendants place patient's neck in collar? <input checked="" type="checkbox"/> Yes <input checked="" type="checkbox"/> No; Splints <input checked="" type="checkbox"/> Yes <input checked="" type="checkbox"/> No; Brace <input checked="" type="checkbox"/> Yes <input checked="" type="checkbox"/> No			
Name of hospital::		Doctor:	
Was patient X-rayed at the hospital? <input checked="" type="checkbox"/> Yes <input checked="" type="checkbox"/> No    What treatment?			
How long did patient stay at hospital?			

Figure 9. Personal Injury Questionnaire

<b>OTHER MEDICAL TREATMENT:</b>	
Has patient been treated by a doctor since the accident? <input type="checkbox"/> Yes <input type="checkbox"/> No If yes, when <input type="checkbox"/> At time of accident <input type="checkbox"/> Next Day	
Doctor's Name:	Address:
What type of treatment did the patient receive?	
<b>HISTORY OF COMPLAINTS:</b>	
Since this injury occurred, are the patient's symptoms: <input type="checkbox"/> Improving <input type="checkbox"/> Getting Worse <input type="checkbox"/> Same	
Describe symptoms from the day following accident to today's date:	
<input type="checkbox"/> Headache	<input type="checkbox"/> Irritability
<input type="checkbox"/> Neck Pain	<input type="checkbox"/> Chest Pain
<input type="checkbox"/> Neck Stiff	<input type="checkbox"/> Dizziness
<input type="checkbox"/> Sleeping Problems	<input type="checkbox"/> Head Seems too Heavy
<input type="checkbox"/> Back Pain	<input type="checkbox"/> Pins Needles in Arms
<input type="checkbox"/> Nervousness	<input type="checkbox"/> Pins Needles in Legs
<input type="checkbox"/> Tension	<input type="checkbox"/> Numbness in Fingers
<input type="checkbox"/> Numbness in Toes	<input type="checkbox"/> Face Flushed
<input type="checkbox"/> Shortness of Breath	<input type="checkbox"/> Buzzing in Ears
<input type="checkbox"/> Fatigue	<input type="checkbox"/> Loss of Balance
<input type="checkbox"/> Depression	<input type="checkbox"/> Fainting
<input type="checkbox"/> Lights Bother Eyes	<input type="checkbox"/> Loss of Smell
<input type="checkbox"/> Loss of Memory	<input type="checkbox"/> Loss of Taste
<input type="checkbox"/> Ears Ring	<input type="checkbox"/> Diarrhea
<input type="checkbox"/> Cold Feet	<input type="checkbox"/> Cold Hands
<input type="checkbox"/> Upset Stomach	<input type="checkbox"/> Constipation
<input type="checkbox"/> Cold Sweats	<input type="checkbox"/> Fever
Symptoms other than above:	
Has patient lost time from work as a result of this accident?	
Last day worked:	Type of Work:
Are you being compensated for time lost from work? <input type="checkbox"/> Yes <input type="checkbox"/> No	
Do you notice any activity restrictions as a result of this injury? If yes, describe. If no, leave blank	
Other pertinent information:	
<input type="checkbox"/> Find Patient	<input type="checkbox"/> Examination Form
<input type="checkbox"/> Patient Information Form	<input type="checkbox"/> Diagnosis Worksheet
<input type="checkbox"/> SOAP Form	<input type="checkbox"/> Return To Admin Menu
<input type="checkbox"/> Print Personal Injury Report	

Figure 9b. Personal Injury Questionnaire cont.



**Chiro Pro - [Assessment and Prognosis]**

File Admin Exam Billing Medical Reports Print Reports Maintenance

## ASSESSMENT AND PROGNOSIS

Select Patient

CHIROPAST PATIENT'S NAME: File Number

**SUBJECTIVE:** Date:

☐ Getting Worse Patient's Narrative:  
☐ Same  
☐ Better

**OBJECTIVE:** ☐ Problem Focused ☐ Expanded ☐ Detailed ☐ Comprehensive

☐ Stiffness ☐ ROM Cervical ☐ Orthopedic Test  
☐ Tender ☐ ROM Lumbar ☐ Neurological Test

**Severity Condition:** ☐

**COMPLEXITY ASSESSMENT** ☐

**Management**

☐ Manipulation ☐ Ultrasound ☐ Electrical Stim ☐ Interseg. Traction ☐ Infrared  
☐ Deep Tissue Therapy ☐ Heat/Cold Pack ☐ Biofeedback ☐ X-Ray Diagnosis ☐ Detailed Hist/Exam/Diag/Treat  
☐ O.V. (Exam/Evaluation/Treat) ☐ Special Medical Report

Prescriptions/Supplies

☐ Add New SOAP  
☐ Previous SOAP  
☐ Next SOAP

☐ Pain ☐ Tightness  
☐ Stiffness ☐ Spasm  
☐ Tingling ☐ Swelling

☐ Find Patient ☐ Examination Form ☐ Personal Injury Form ☐ Return To Exam Menu  
☐ Patient Information Form ☐ Diagnosis Worksheet ☐ Print SOAP Form

Figure 10. Subjective, Objective, Assessment, and Prognosis Form

**Chiro Pro - [Diagnosis Worksheet]**

File Admin Exam Billing Medical Reports Print Reports Maintenance

## DIAGNOSIS WORKSHEET

Patient :  
File Number:  
DOI : Select Patient

**Diagnostic Code and Description:**

☐ Find Patient ☐ Patient Information Form ☐ Examination Form ☐ Return To Exam Menu  
☐ SOAP Form ☐ Personal Injury Form ☐ Print Diagnosis Worksheet

Figure 11. Diagnosis Worksheet Form

**Chiro Pro - [Chiropractic Examination Form 1]**

File Admin Exam Billing Medical Reports Print Reports Maintenance

## CHIROPRACTIC EXAMINATION

Patient :  
 File# :  
 DOI : Select Patient

☒ **New Exam**    ☐ Initial Exam    ☐ Subsequent Exam    ☐ Final Exam  
☒ **Next Exam**  
☒ **Previous Exam**

Date of examination: |

Weight:    lbs    Height:

Blood Pressure		Dynamometer	Deep Tendon Reflexes	
Left Arm:		Left:    Right:	Left	Right
Right Arm:			0 1 2 3 4	0 1 2 3 4
Pulse:    Per/Min			Biceps	⊙ ⊙ ⊙ ⊙ ⊙
George's Test Left			Triceps	⊙ ⊙ ⊙ ⊙ ⊙
Right:			Radial	⊙ ⊙ ⊙ ⊙ ⊙
			Patellar	⊙ ⊙ ⊙ ⊙ ⊙
			Achilles	⊙ ⊙ ⊙ ⊙ ⊙

CERVICAL RANGE OF MOTION				Dorsolumbar Range of Motion			
	N	Pt. Degrees ROM	Notes		N	Pt. Degrees ROM	Notes
Flexion:	45			Flexion:	75/90		
Extension:	55			Extension:	30		
Rt Lateral:	40			Rt Lateral:	35		
Lt Lateral:	40			Lt Lateral:	35		

SITTING		NEUROLOGICAL ORTHOPEDIC TESTS (Positive or Negative)	
	Pos Neg	Remarks	
Foramina Comp Test	Center ⊙ ⊙		
	Left ⊙ ⊙		
	Right ⊙ ⊙		
Max Cerv. Comp. Test	Left ⊙ ⊙		
	Right ⊙ ⊙		
Valsalvas Maneuver	Cervical ⊙ ⊙		
	Thoracic ⊙ ⊙		
	Lumbar ⊙ ⊙		
Adson's Test	Left ⊙ ⊙		
	Right ⊙ ⊙		
Bechterew Test	Left ⊙ ⊙		
	Right ⊙ ⊙		
	Both ⊙ ⊙		

Figure 12. Chiropractic Examination Form

Chiro Pro - [Chiropractic Examination Form 1]			
<b>STANDING</b>			
		Pos	Neg
Heel Walk Test		<input type="radio"/>	<input type="radio"/>
Toe Walk Test		<input type="radio"/>	<input type="radio"/>
Romberg's Sign		<input type="radio"/>	<input type="radio"/>
Kemp's Test	Left	<input type="radio"/>	<input type="radio"/>
	Right	<input type="radio"/>	<input type="radio"/>
Neri's Bowing Sign	Left	<input type="radio"/>	<input type="radio"/>
	Right	<input type="radio"/>	<input type="radio"/>
<b>SUPINE</b>			
		Pos	Neg
Lasague Test	Left	<input type="radio"/>	<input type="radio"/>
	Right	<input type="radio"/>	<input type="radio"/>
Braggard's Sign	Left	<input type="radio"/>	<input type="radio"/>
	Right	<input type="radio"/>	<input type="radio"/>
Fajerstajn Test	Left	<input type="radio"/>	<input type="radio"/>
	Right	<input type="radio"/>	<input type="radio"/>
Sicard's Sign	Left	<input type="radio"/>	<input type="radio"/>
	Right	<input type="radio"/>	<input type="radio"/>
DLR Test		<input type="radio"/>	<input type="radio"/>
Patrick's Test	Left	<input type="radio"/>	<input type="radio"/>
	Right	<input type="radio"/>	<input type="radio"/>
Soto-Hall Test	Cervical	<input type="radio"/>	<input type="radio"/>
	Thoracic	<input type="radio"/>	<input type="radio"/>
	Lumbar	<input type="radio"/>	<input type="radio"/>
<b>PRONE</b>			
		Pos	Neg
Ely's Sign	Left	<input type="radio"/>	<input type="radio"/>
	Right	<input type="radio"/>	<input type="radio"/>
Nachlas Test	Left	<input type="radio"/>	<input type="radio"/>
	Right	<input type="radio"/>	<input type="radio"/>
Erichson's Sign		<input type="radio"/>	<input type="radio"/>
Derifield Test	Left	<input type="radio"/>	<input type="radio"/>
	Right	<input type="radio"/>	<input type="radio"/>
Hibb's Test	Left	<input type="radio"/>	<input type="radio"/>
	Right	<input type="radio"/>	<input type="radio"/>
Ely Heel-Buttock Test	Left	<input type="radio"/>	<input type="radio"/>
	Right	<input type="radio"/>	<input type="radio"/>

Figure 12b. Chiropractic Examination Form cont.

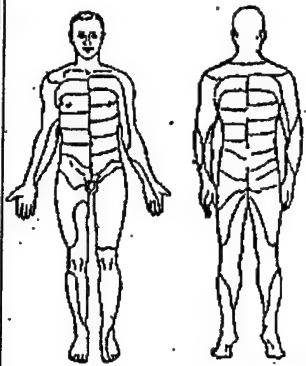
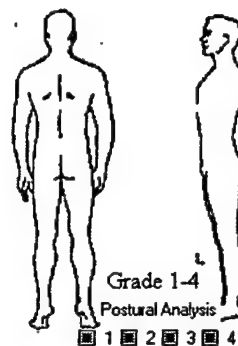
Date of examination: 8/24/97

☐ New Exam☐ Previous Exam☐ Next Exam**Spinal Palpation**

Grading System: +1 to +4

Light, Moderate, Significant, Extreme

	Left				Right			
	1	2	3	4	1	2	3	4
OCC								
AT								
AX								
C3								
C4								
C5								
C6								
C7								
D1								
D2								
D3								
D4								
D5								
D6								
D7								
D8								
D9								
D10								
D11								
D12								
L1								
L2								
L3								
L4								
L5								
S								
SI								
IL								

**Dermatome**  
A to P Patterns P to A**Postural Analysis**  
P to A Analysis Lateral Analysis**Bilateral Scale Differential**

Left: lbs Right: lbs  
Difference: lbs.

%Improvement: %

Subjective Symptomology:

New Symptomology:

Figure 12c. Chiropractic Examination Form cont.

**Chiro Pro - [Itemized Statement Form]**

File Admin Exam Billing Medical Reports Print Reports Maintenance

## ITEMIZED STATEMENT FORM

Patient : .

File Number:                      Select Patient ▼

	Date:	Procedure Description:	CPT:	Charge:	
▶					

☐ Find Patient's Statement

☐ Payments

☐ Print Itemized Statement

☐ Return To Billing and Claims Menu

**Total Balance:**

**Amount Paid:**

**Balance Due:**

Figure 13. Itemized Statement Form

## **APPENDIX D. REPORTS**

### **Medical Report**

Law Offices of James Sanford and Paul Monroe  
123 ABC Lane  
Monterey, CA 93940  
Attention: Mr. Sanford

Your Client/Our Patient: Sullivan, Frank Alonzo  
D.O.I: 1/28/97

August 24, 1997

Dear Mr. Sanford:

Mr. Sullivan, a 31-year old male, entered this office on February 03, 1997 for complications sustained in an automobile accident that took place on January 28, 1997.

#### **HISTORY OF INJURY**

Mr. Sullivan reported that he was driving his car on a parking lot located in San Jose and another car struck him from behind. At the onset, Mr. Sullivan was shaken and scared. As he was able to put himself together, he went home. He began feeling headache, dizziness, fatigue, pain on chest, neck and back, and developed walking difficulty due to continuing pain on his left knee. Hoping that these symptoms would go away in a couple of days, he was reluctant seeking medical care. As the pain worsened, especially on the left leg, Mr. Sullivan came to this office for physiotherapy. Mr. Sullivan stated that he enjoyed good health prior to the aforementioned accident. He denied any history of complaints similar to those reported in this accident.

**EXAMINATION** (Details of examination, diagnosis examination, and treatment are on file):

**Head:** There were no palpable tenderness, recent abrasions or lesions. However, the patient complained of a severe headache.

**Cervical spine:** Palpable tenderness and tightness on both upper traps were noted.

**Neck:** Pain or discomfort was felt for almost all movements of neck (flexion, rotation, extension, bilateral bending, and rotation).

Thoracic spine: Tenderness was noted on deep palpation over both paraspinal muscles, bilateral.

Lumbar Spine: Discomfort/pain was felt on back flexion/extension and during both right and left lateral bending and on rotation

DIAGNOSIS:

CF5	729.20	Radicular Neuralgia
CF6	729.20	Cervical Neuralgia
NF1	346.00	Migraine Headache

TREATMENT:

Mr. Sullivan was treated using conservative chiropractic manipulation combined with physiotherapy modalities (ultrasound, hot/cold pack, electrical simulation, intersegmental traction) for the stabilization and rehabilitation of the injured areas and prevention of permanent impairment and disability. On June 23, 1997, Mr. Sullivan was determined to have reached pre-injury status with no symptoms and positive findings on exam and was discharged from active treatment.

PROGNOSIS:

Mr. Sullivan has shown positive response to chiropractic treatment. The prognosis appears good despite the possibility of occasional recurrence of symptoms.

Please call us if we can be of any further assistance.

Sincerely,

John Doe, D.C.

## ITEMIZED STATEMENT

**Patient:**

**Frank Alonzo Sullivan**  
**1301 Newtown Road**  
**San Jose, CA 95124**

Date: **8/24/97**  
File No.: **SUL-100**

<b>Date</b>	<b>Procedure Description</b>	<b>CPT</b>	<b>Charge</b>
7/21/97	Infrared	97997	\$40.00
7/21/97	Intersegmental traction	97012	\$25.00
7/21/97	Biofeedback	97999	\$30.00
7/21/97	X-Ray Diagnosis	97998	\$25.00
7/21/97	Intersegmental traction	97012	\$25.00
7/21/97	Heat/cold by area	97010	\$15.00
7/21/97	O.V. (Exam/Evaluation/Treat)	99213	\$80.00
7/21/97	Deep tissue therapy reduced	97124-52	\$20.00
7/21/97	Intersegmental traction	97012	\$25.00
7/21/97	O.V. (Exam/Evaluation/Treat)	99213	\$80.00
7/21/97	Biofeedback	97999	\$30.00
7/21/97	X-Ray Diagnosis	97998	\$25.00
7/24/97	X-Ray Diagnosis	97998	\$25.00
7/24/97	Heat/cold by area	97010	\$15.00
7/24/97	Infrared	97997	\$40.00
7/24/97	Detailed Hist/Exam/Diag/Treat	99203	\$125.00
7/24/97	Biofeedback	97999	\$30.00
7/24/97	O.V. (Exam/Evaluation/Treat)	99213	\$80.00
7/24/97	Special Medical Report	99080	\$50.00
7/24/97	Biofeedback	97999	\$30.00
7/26/97	Manipulation	97260	\$45.00
7/28/97	Ultrasound	97035	\$20.00

**Total Balance:** \$880.00  
**Amount Paid:** \$620.00  
**Balance Due:** \$260.00





## LIST OF REFERENCES

Callahan, Evan, *Access 97 Visual Basic Step by Step*, Microsoft Press, 1997.

Irwin, Michael R. And Prague, Cary N., *Access for Windows 95 Bible*, 3rd Edition, IDG Books Worldwide, Inc., 1995.

Kendall, Julie and Kenneth, *Systems Analysis and Design*, 3rd Edition, Prentice Hall, Inc., 1995.

Kroenke, David M., *Database Processing*, 5th Edition, Prentice Hall, Inc., 1995.



## INITIAL DISTRIBUTION LIST

1. Defense Technical Information Center ..... 2  
8725 John J. Kingman Rd., STE 0944  
Ft. Belvoir, VA 22060-6218
2. Dudley Knox Library ..... 2  
Naval Postgraduate School  
411 Dyer Rd.  
Monterey, CA 93943-5101
3. Tung X. Bui, Code SM/BD ..... 1  
Naval Postgraduate School  
Monterey, CA 93943
4. Balasubramaniam Ramesh ..... 1  
Associate Professor of CIS  
College of Business Administration, Georgia State University  
35 Broad St  
Atlanta, GA 30303
5. Rodney A. Bolling ..... 1  
1520 Channing Pl  
Pensacola, FL 32534